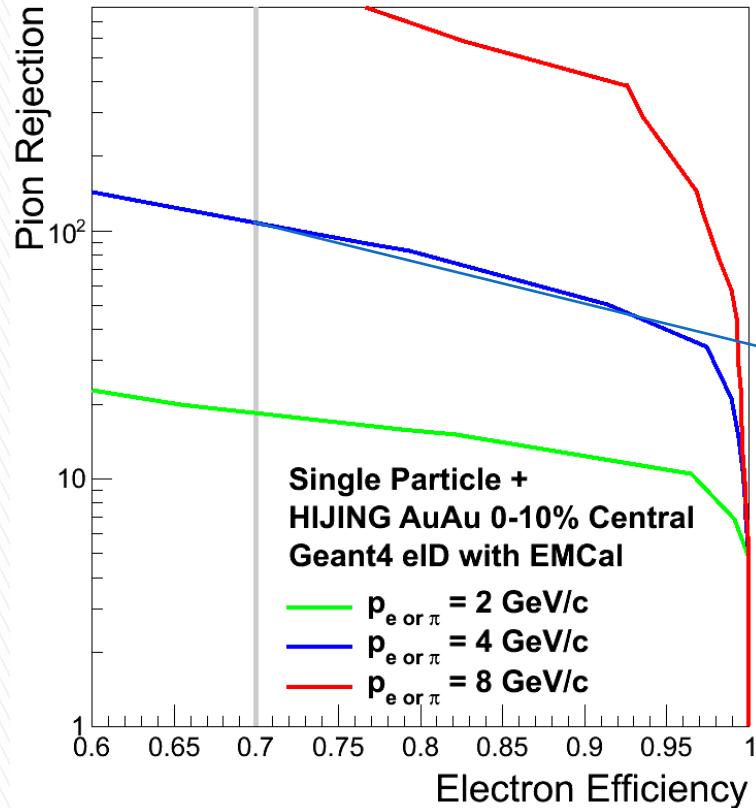


# Quick update on new EMCal implementation in Geant4

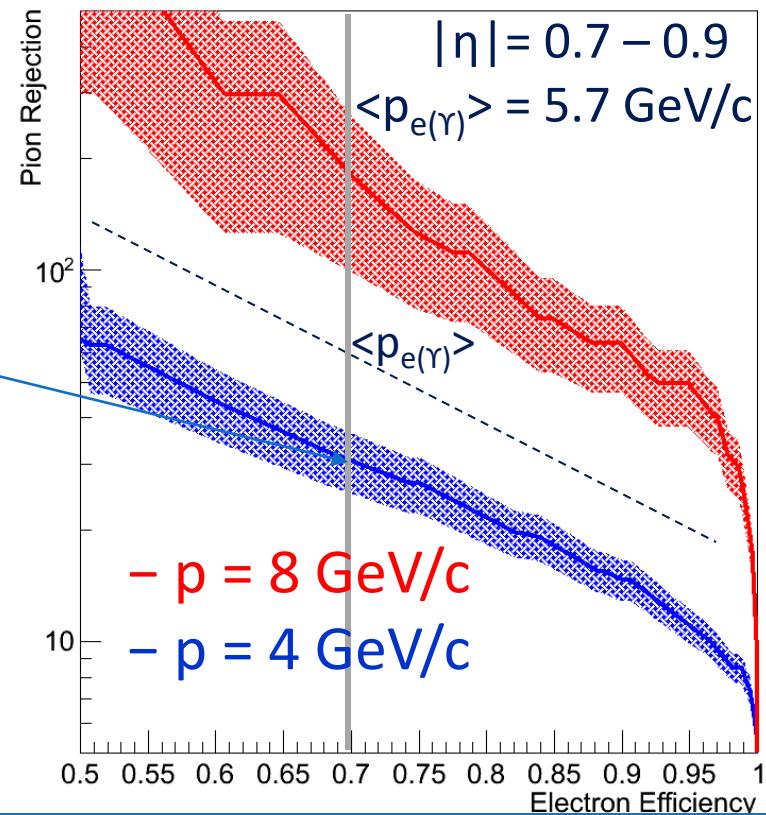
Jin Huang

for the sPHENIX EMCal group

# 2D tapered SPACAL driven by improving electron ID at larger rapidity

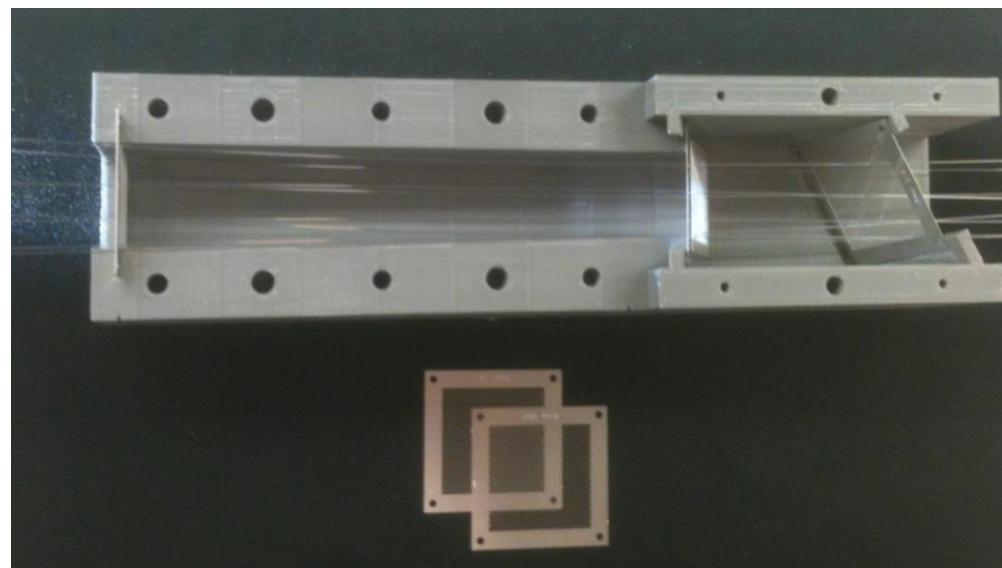
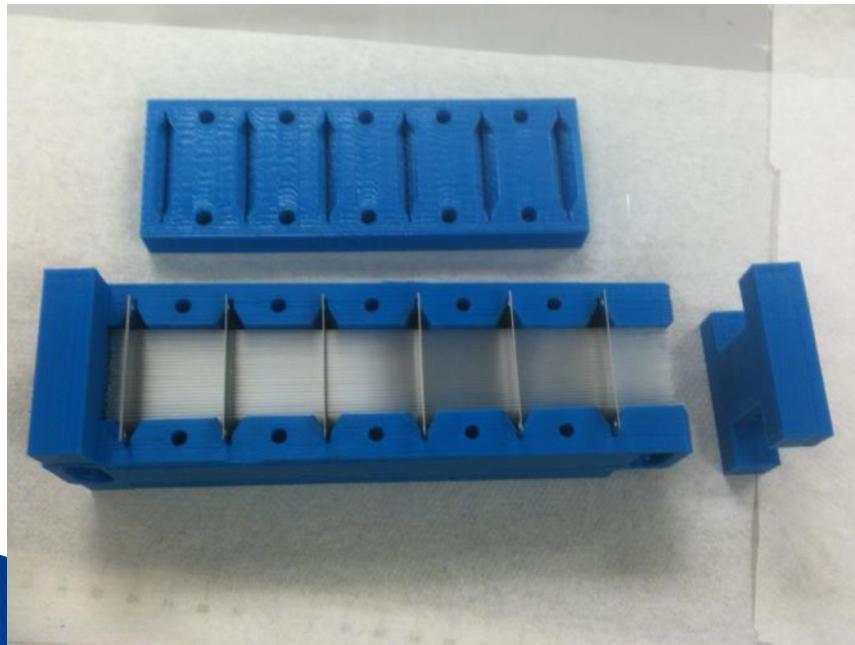
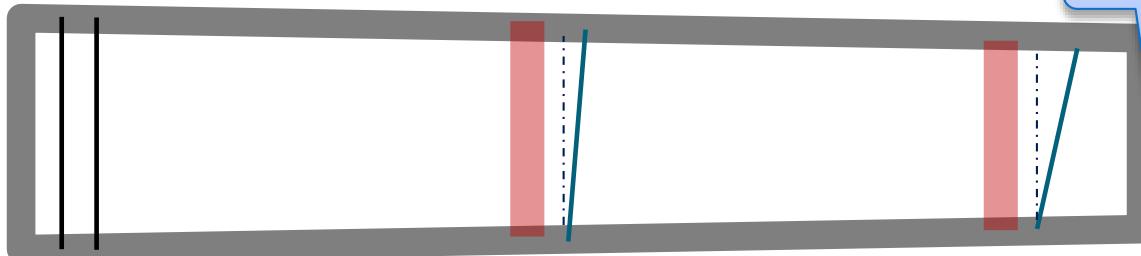


Central rapidity,  $|\eta| < 0.2$   
Effectively projective in polar direction



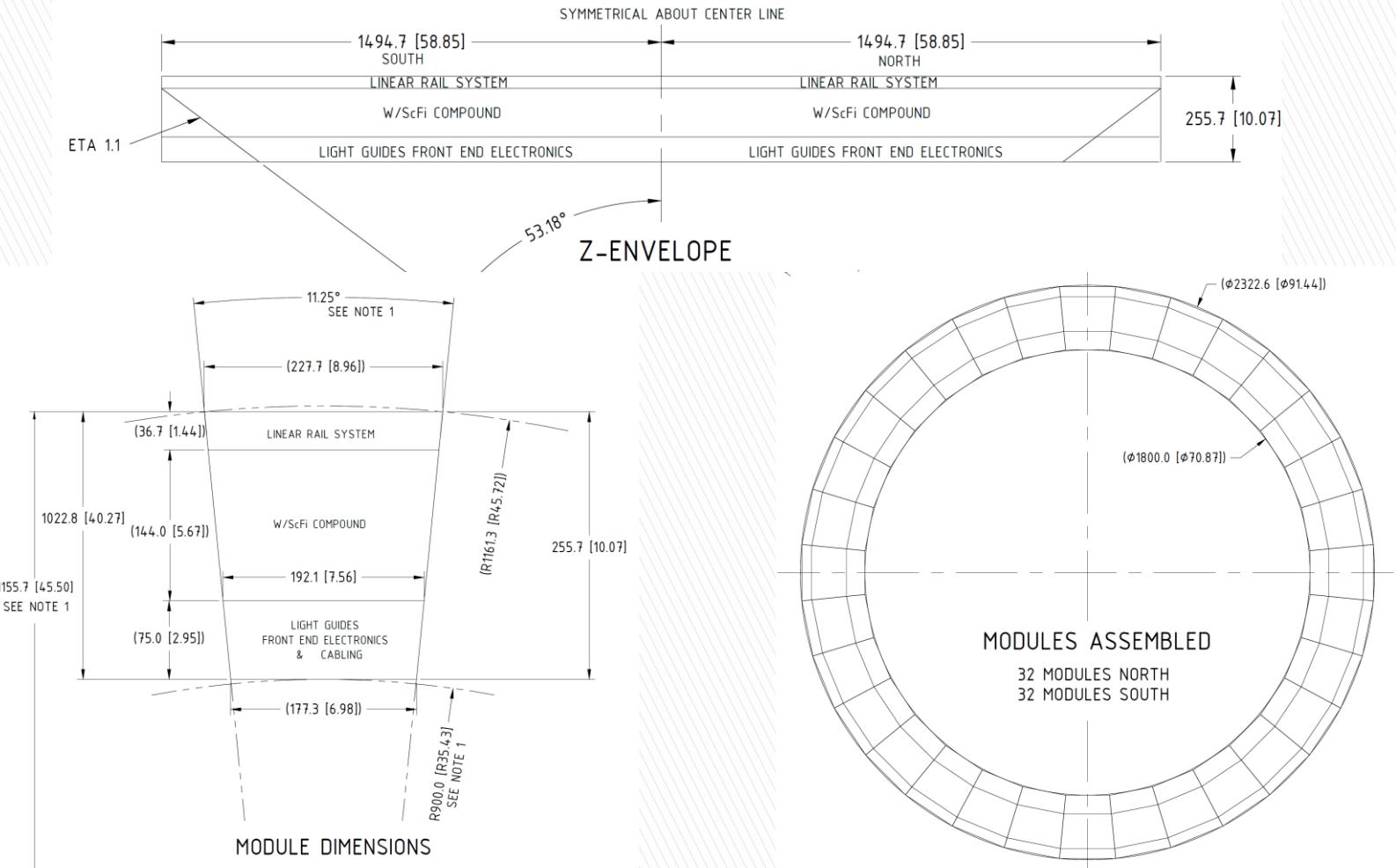
Forward rapidity,  $|\eta| = 0.7 - 0.9$   
non-projective in polar direction

# On-going R&D at BNL: world first 2-D tapered SPACAL



Sean Stoll, Spencer Locks, Craig Woody, Jin Huang and many others

# EMCal profile from Richie, etc.

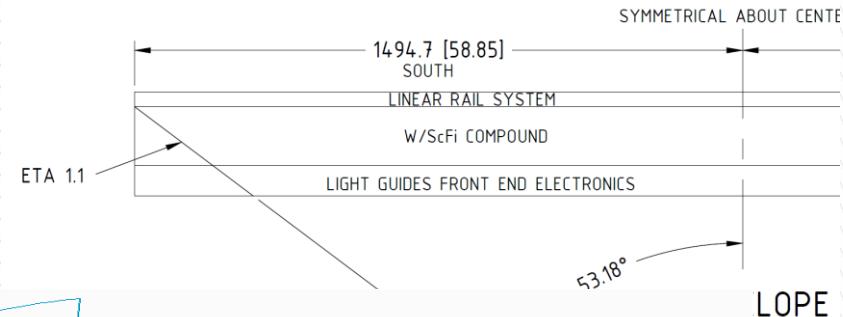
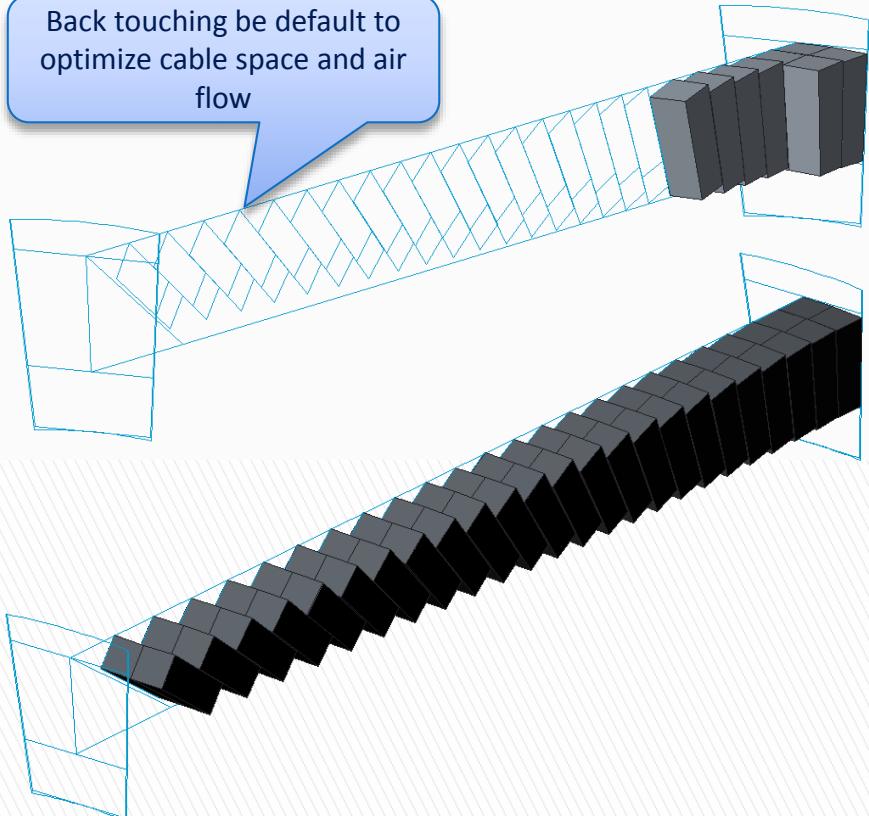


Module dimensions

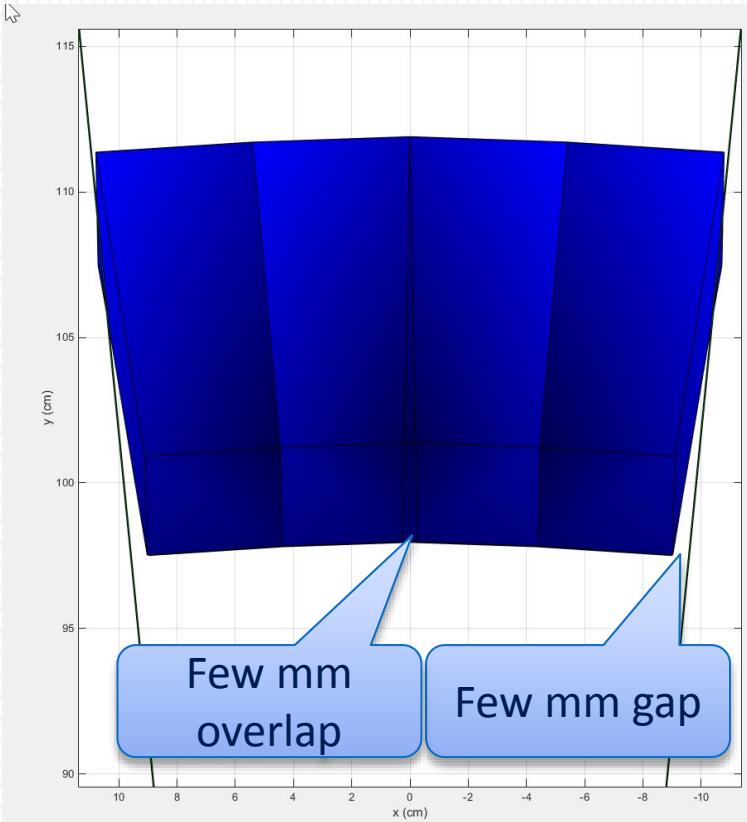
Assembled

# Half module layout

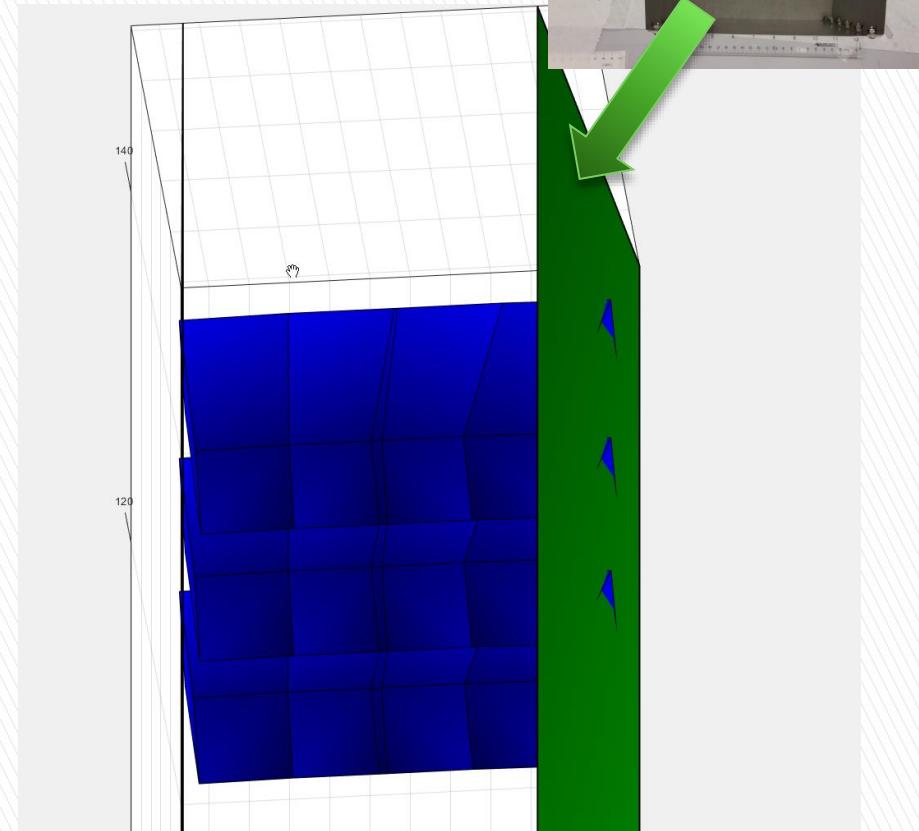
Chris Cullen (BNL/CAD)



# However, right now there is a confliction and a gap

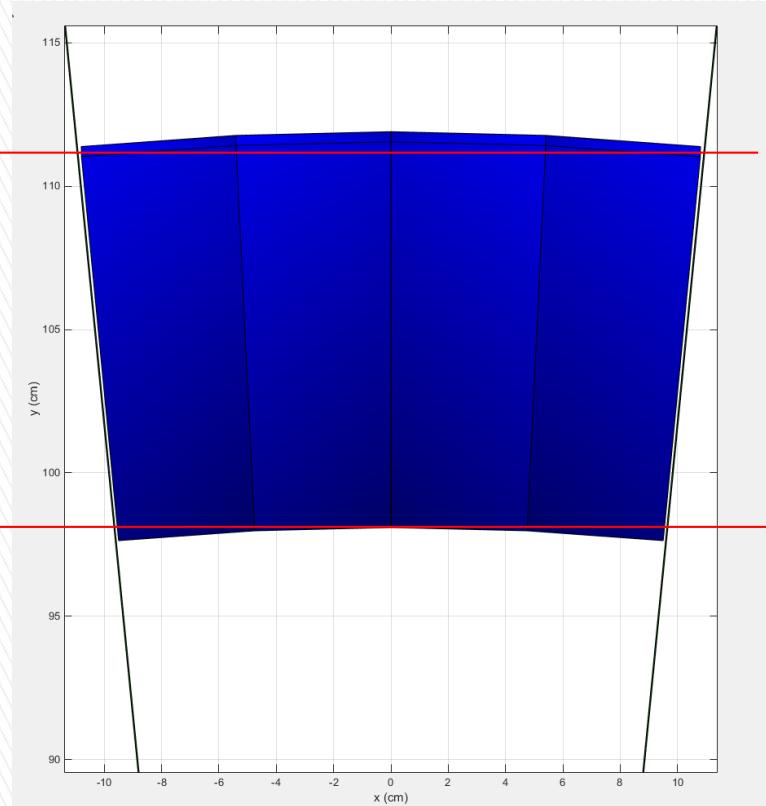


View of the last row of calorimeter long z axis

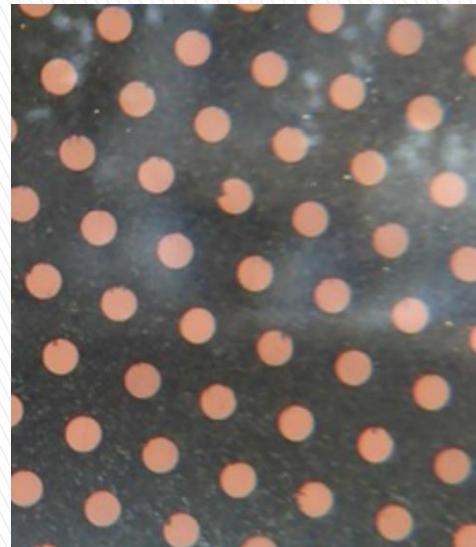


View of the last 3 rows of calorimeter from beam side

# A solution

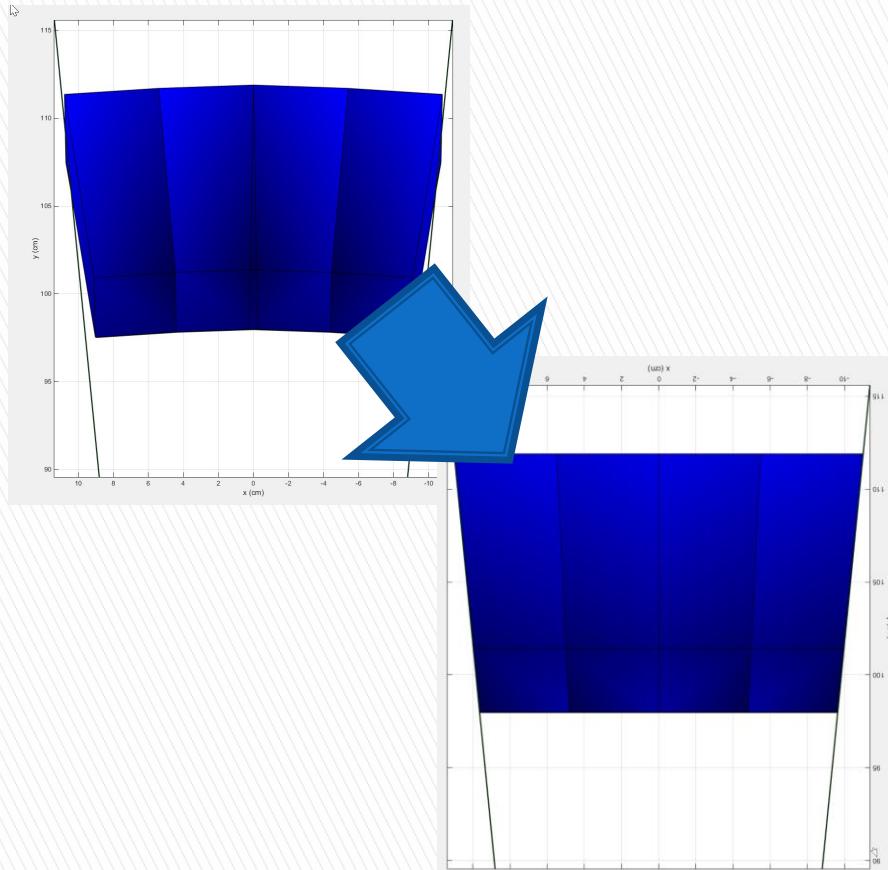


Build blocks to fit and machine  
cut top and bottom to flat

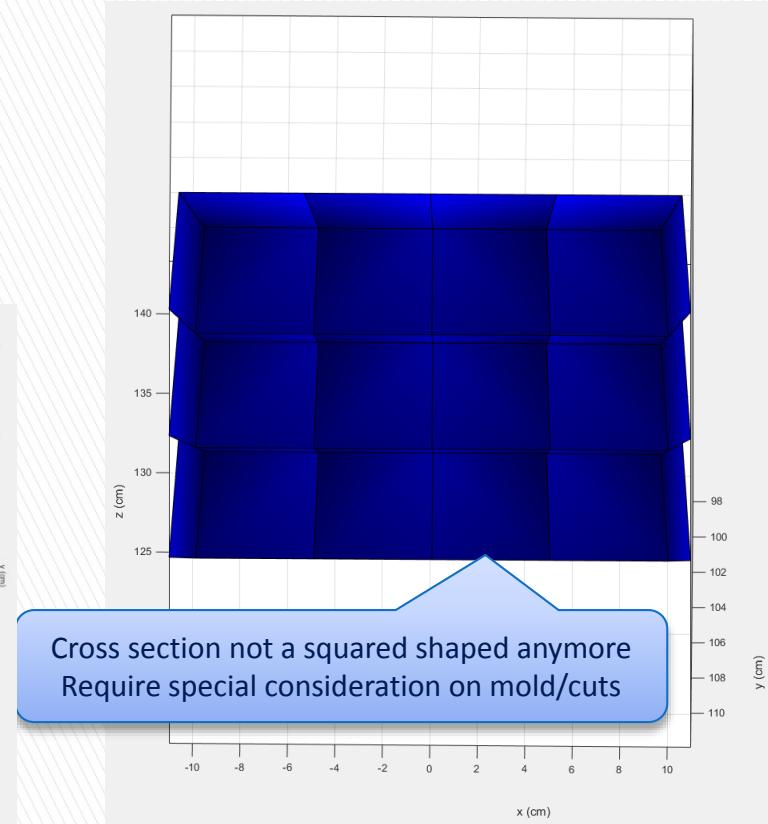


Experimental diamond cut  
UIUC group

# Last row after the surface cut



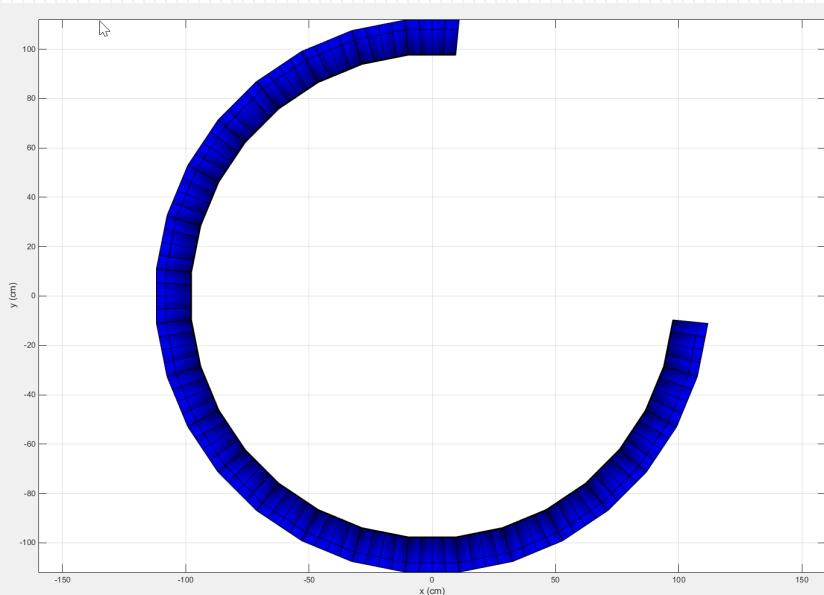
View from end



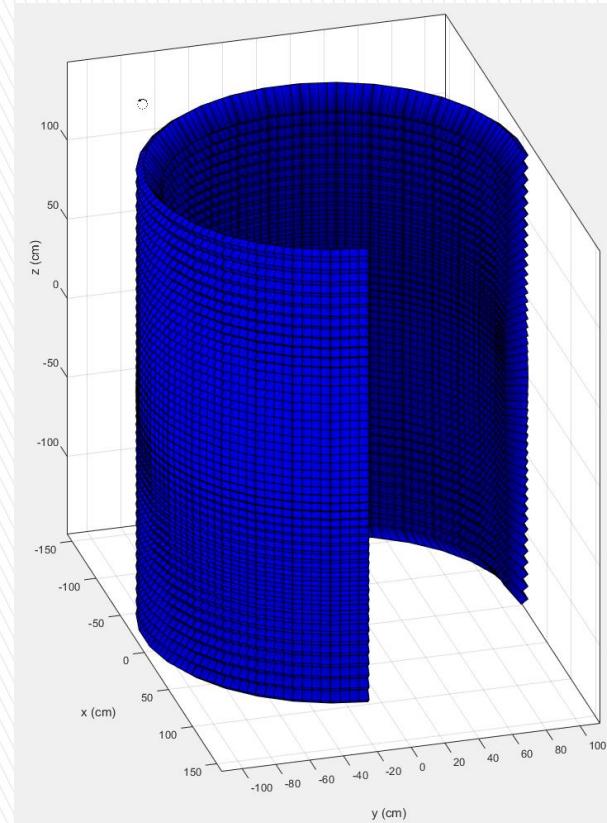
View from beam

# Put it all together

- 2D R-Z layout from Chris
- ReGenerated in MatLab
- now ready to export into Geant4



Beam-axis view



3D view

# Implementing 2D tapered calorimeter in Geant4

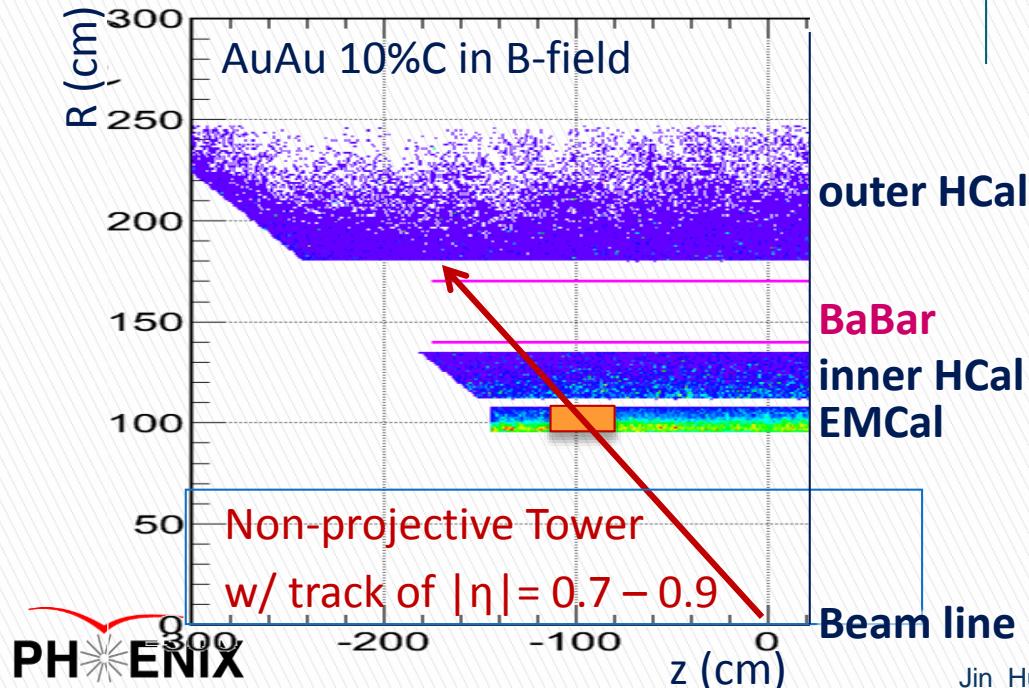
- ▶ DST Node parameterize the SPACAL parameters
  - Similar the current [PHG4CylinderGeom\\_Spacalv2](#)
  - Tunable through macro <- working
  - Read block parameters from text file and later database  
<- need to work out
  - Use for construct SPACAL in Geant4 <- working
  - Use for analysis to get location of the tower <- need work
- ▶ Place the calorimeter modules in Geant4 with a macro switch, similar to the current [G4\\_CEmc\\_Spacal.C](#)
- ▶ If no major change suggested, expect to be available before the next meeting

# Extra Information

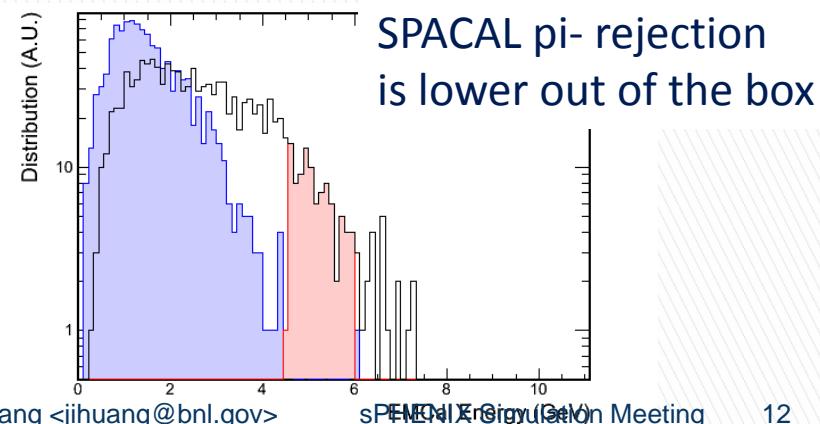
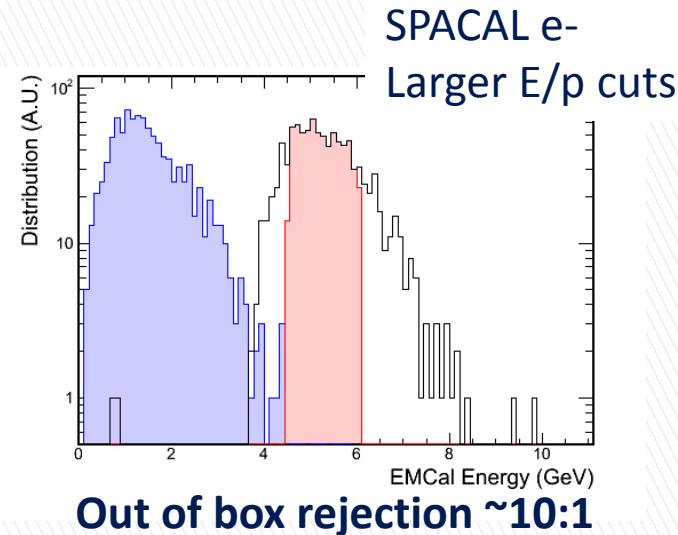


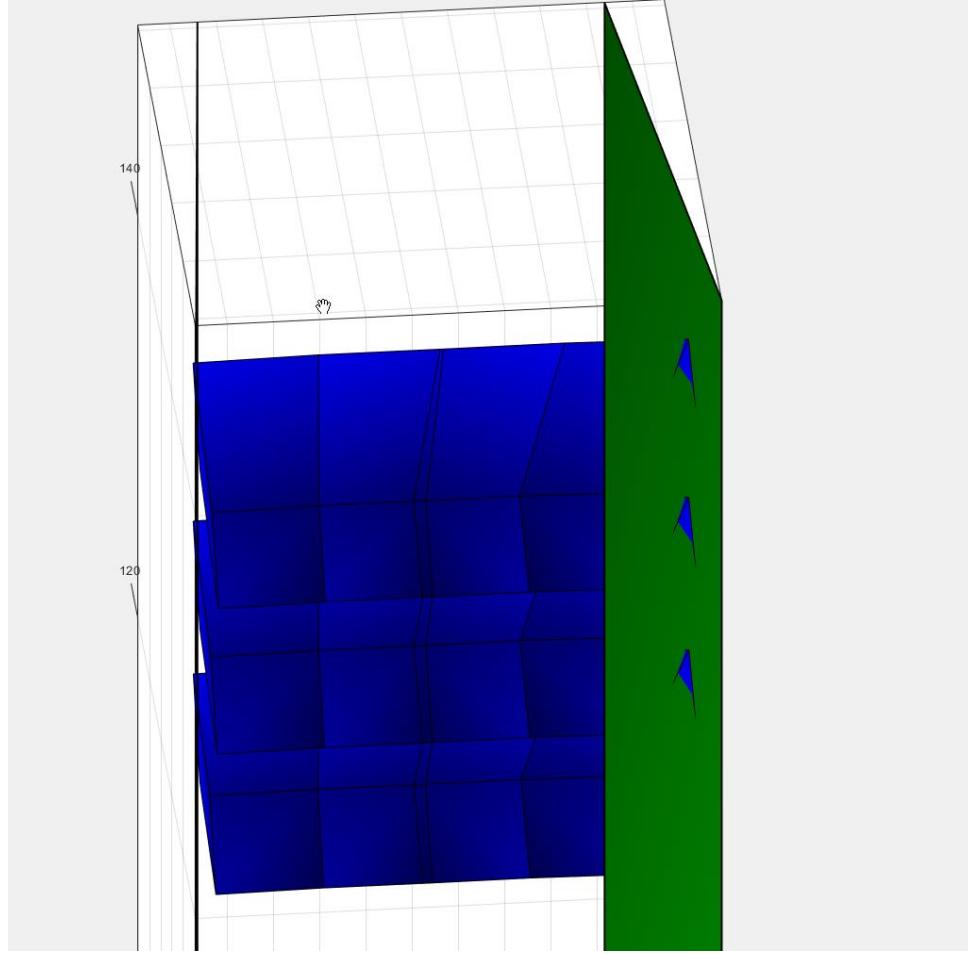
# Larger pseudo-rapidity in central AuAu : under study

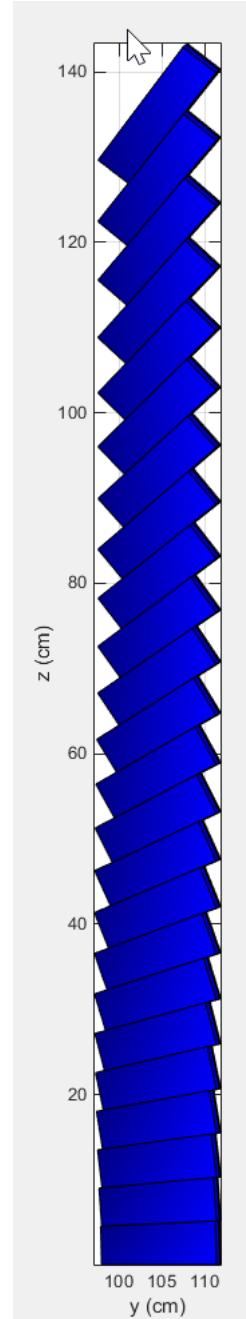
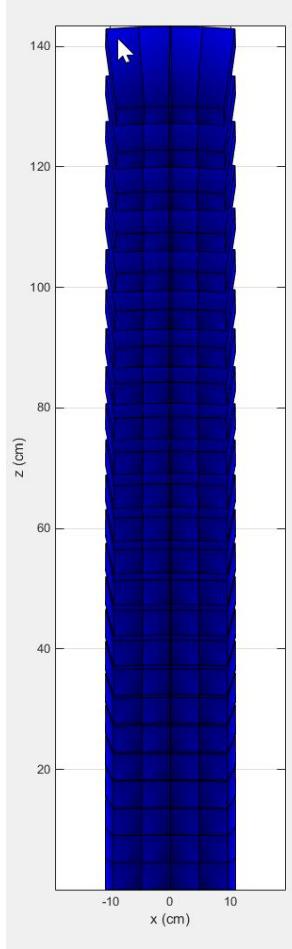
- Out of the box: larger  $|\eta| \rightarrow$  larger background
  - Longer path length in calorimeter
  - Covers more non-projective towers
- to improve
  - Better estimate of the underlying background event-by-event (improve x1.5)
  - Use (radially) thinner ECal (improve x2)
  - Possibilities for projective towers?

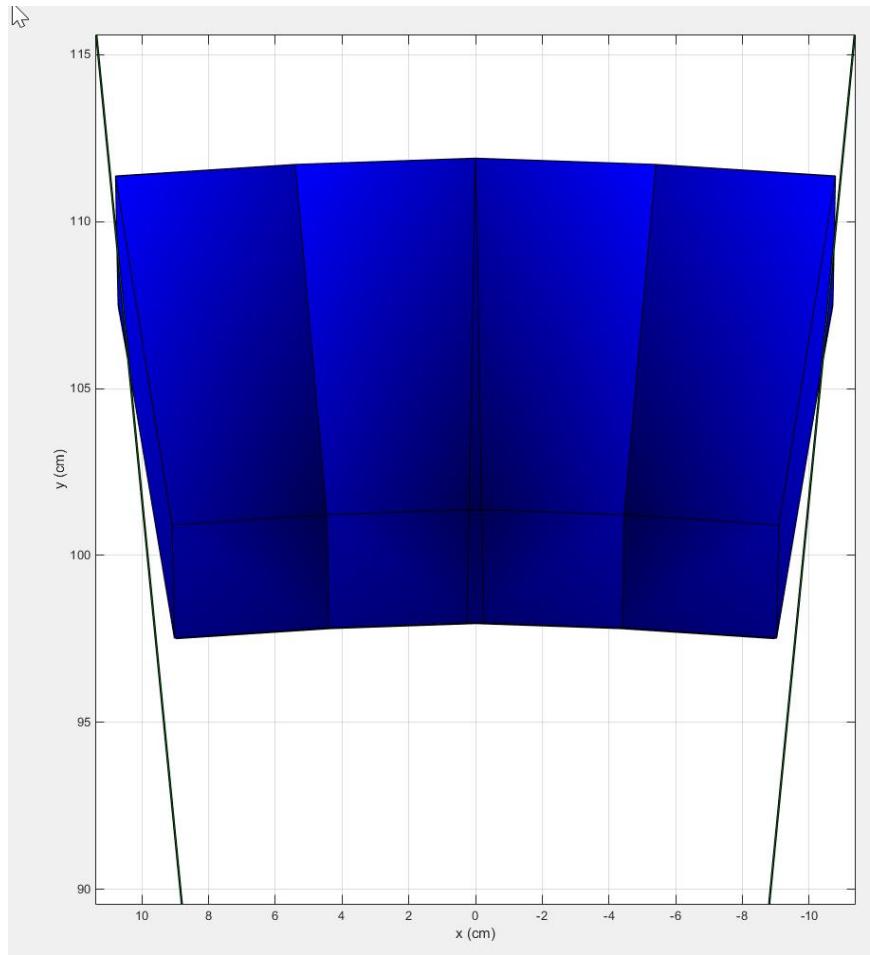


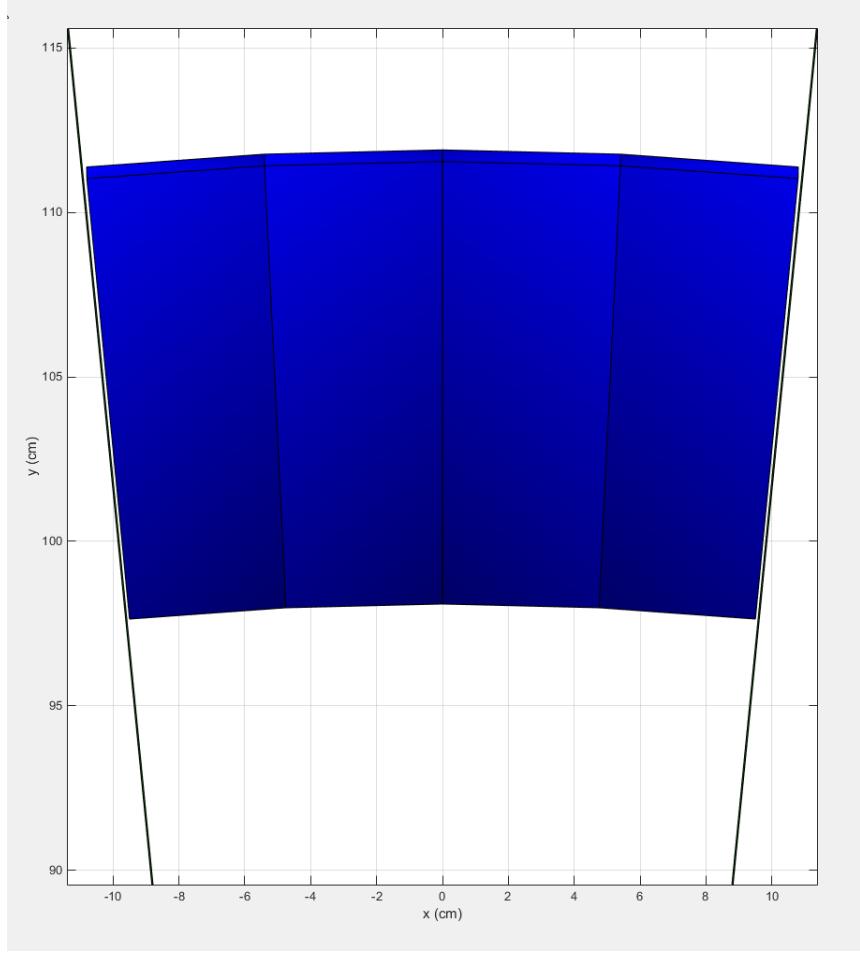
- all events (w/ embedding)
- with EMCAL E/p cut (w/ embedding)
- Hijing background (AuAu 10%C in B-field)

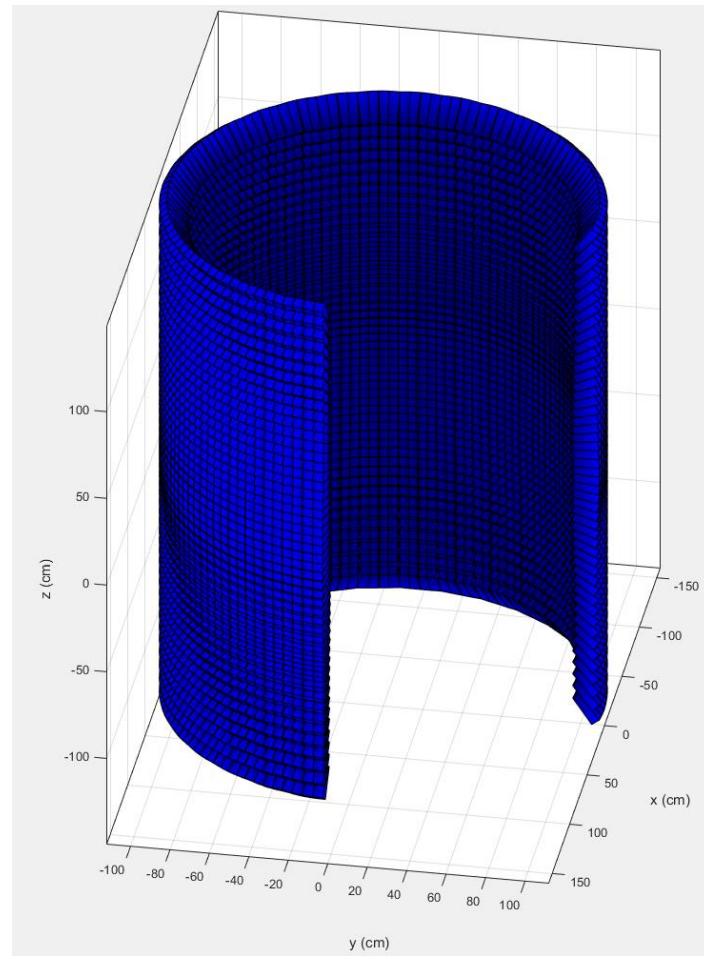


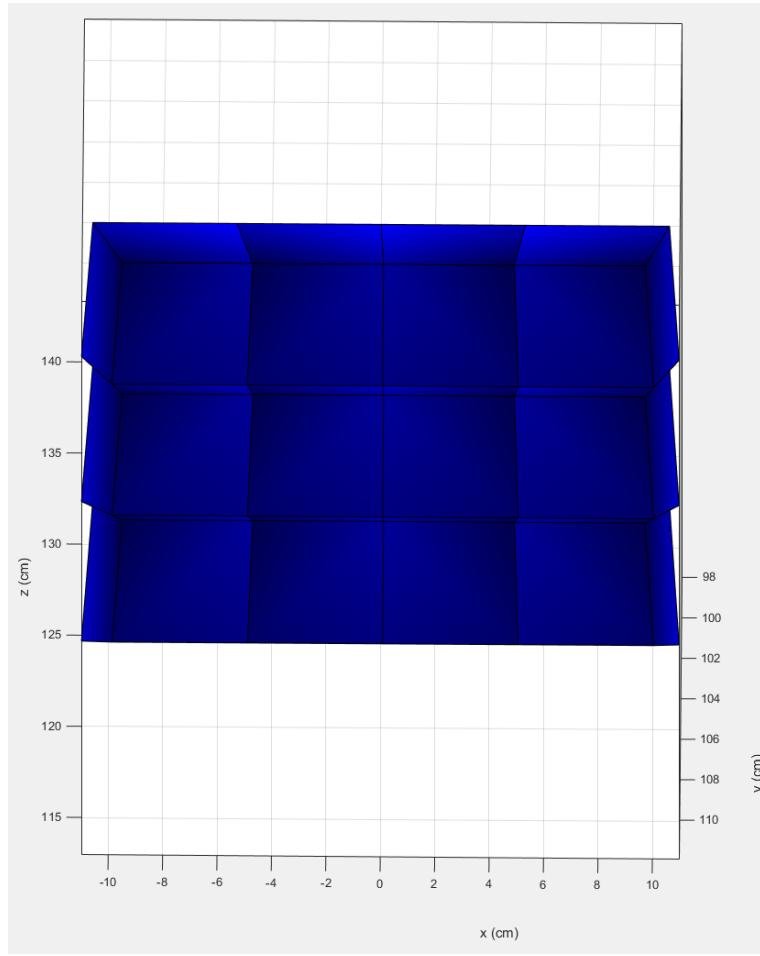


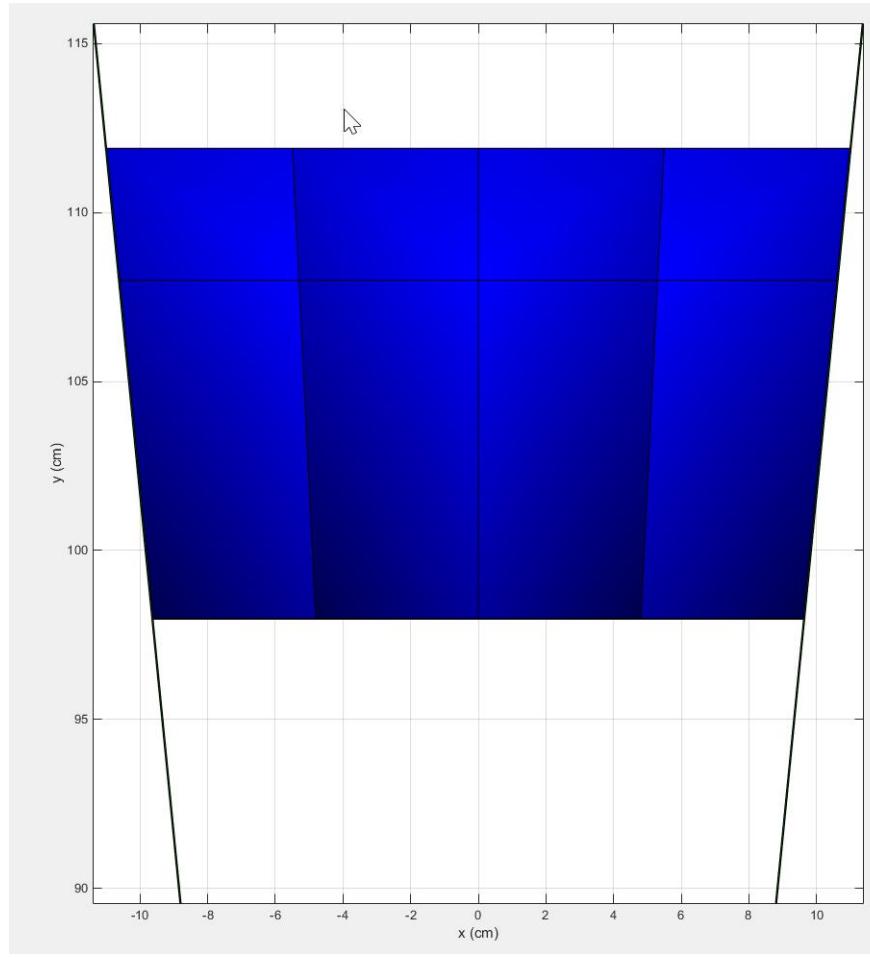


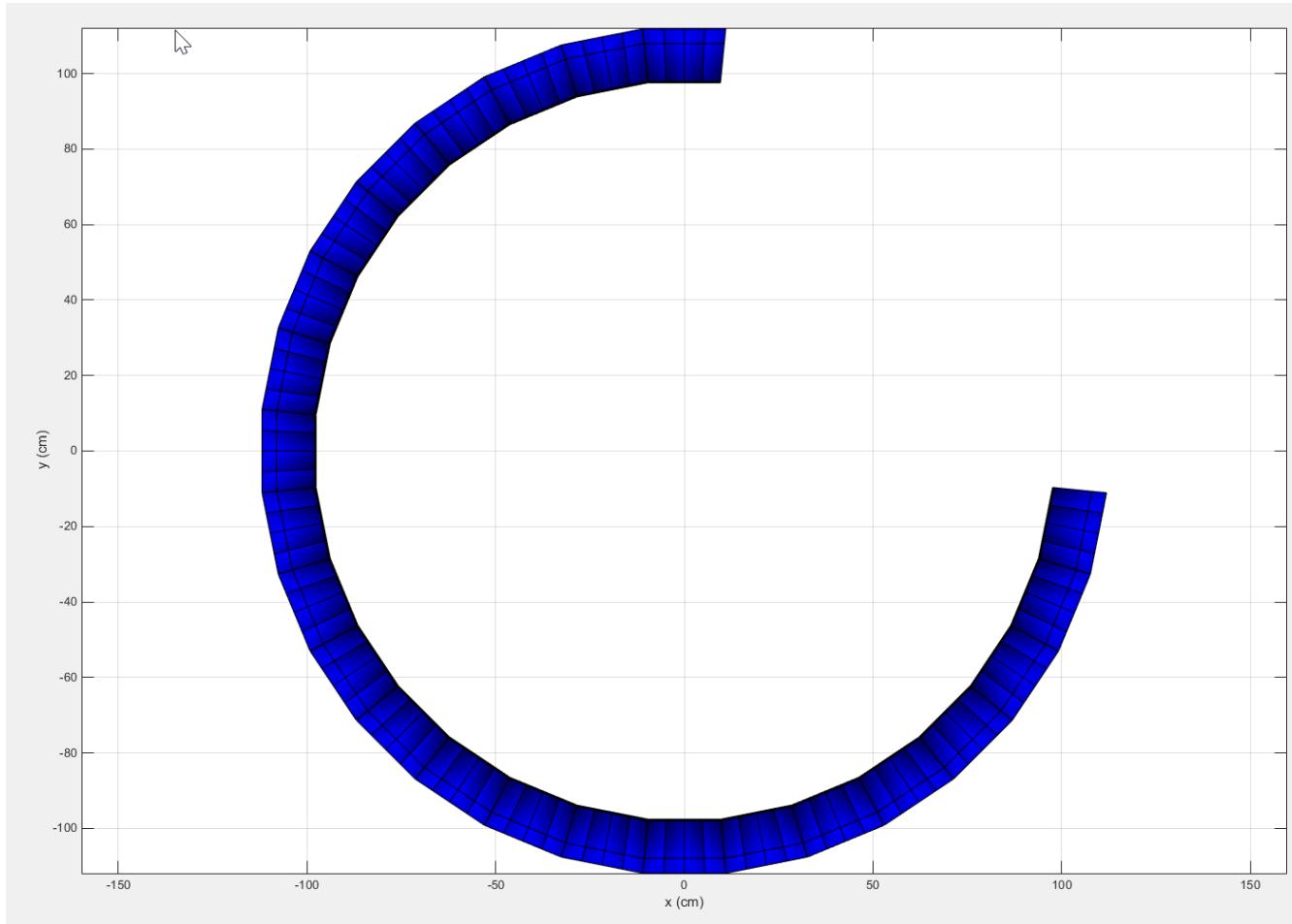


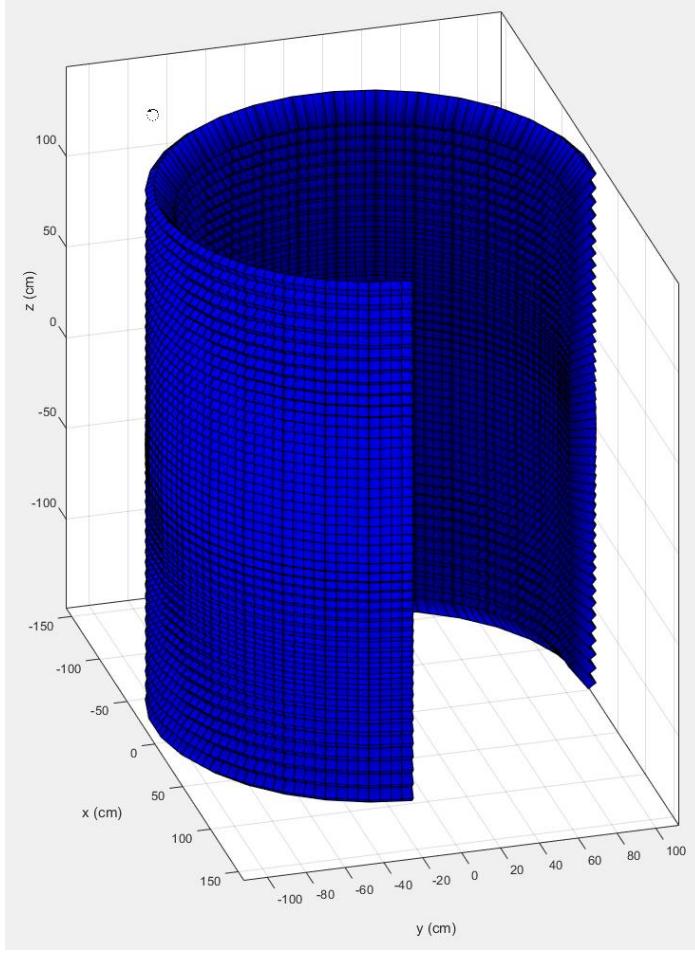


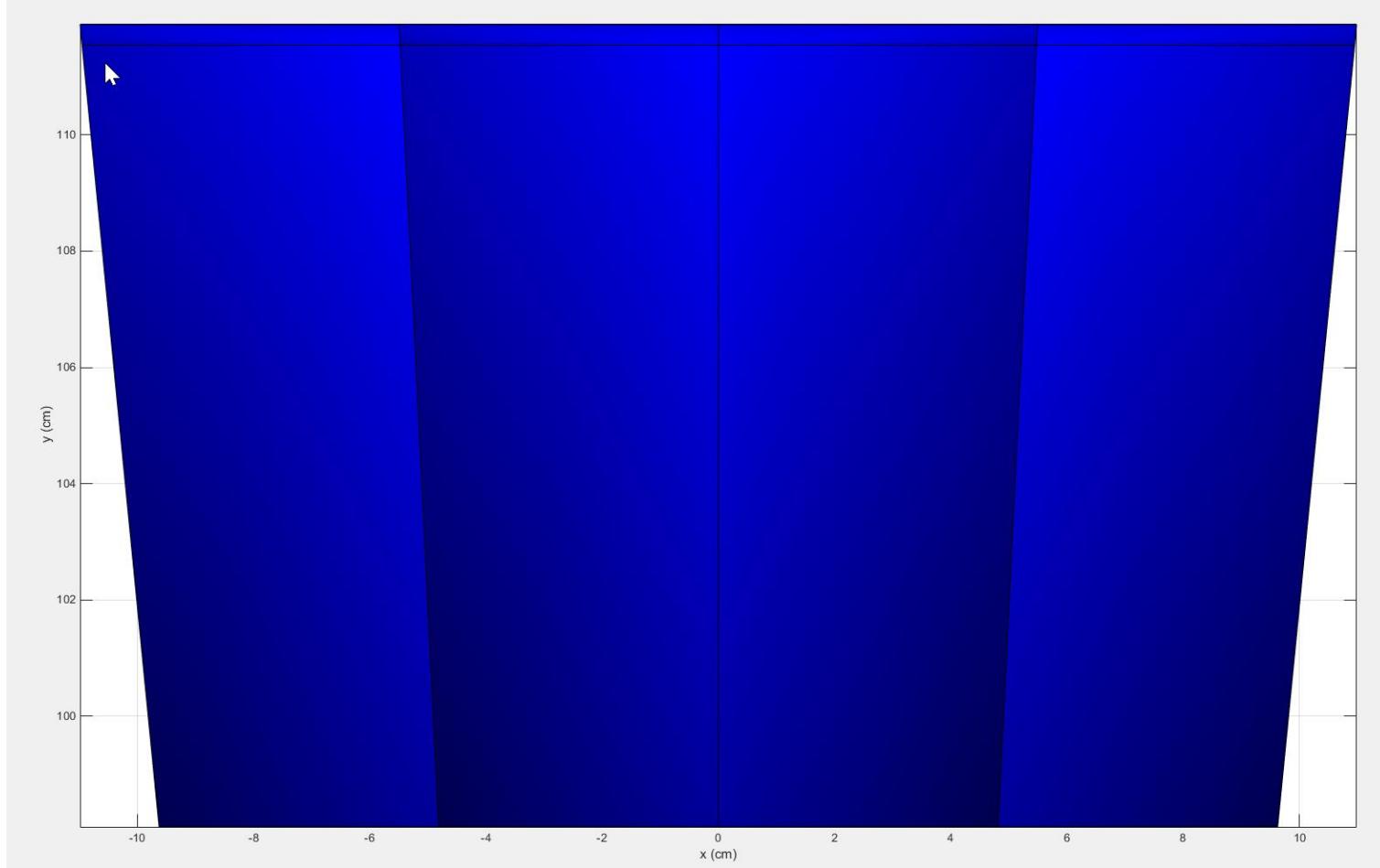












# The module enclosure demo

